DYNAMIC SYSTEMS AND THE THERAPEUTIC ACTION OF THE ANALYST

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Way Beyond Freud

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Table of Contents

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Freud (1895/1966) dreamed of grounding his theory of the mind in the neurological science of his day. His project for a scientific psychology was never realized because 19th century neuroscience could not account for higher mental functions. Today, empirically based theories of neurological organization and development are coming close to actualizing Freud's dream: a beginning unification of the brain and the mind (Edelman, 1992). Dynamic Systems Theory (see Thelen & Smith, 1994) is the vehicle that unifies body, mind, and behavior into a single operating system. It describes how living systems self-organize and transform themselves into increasingly complex entities as well as how these systems interrelate with one another and with their environments.

As a root paradigm for organization and change Dynamic Systems Theory enables an integration of many diverse psychoanalytic theories and practices, permitting a robust understanding of human development and of the techniques required to change both normal and pathological organizations of the mind (Miller, 1999). While preserving the essence of

psychoanalysis as a method for changing the unconscious pathological elements that organize maladaptive behavior. Dynamic Systems Theory changes the focus of analytic treatment from the recovery and reconciliation of repressed or dissociated memories, wishes, and fantasies to the active restructuring of the mind within the context of the therapeutic interaction. From this perspective it is the analyst's active engagement of the patient that initiates change in a patient's mental organization.

The idea that a patient's psychopathology is affected by the analyst's behavior is not a new one, having roots in both the American and British schools of psychoanalysis. What is new within modern and postmodern psychoanalysis is the pivotal role of transference-countertransference enactments in the therapeutic process. The postmodern psychoanalytic enterprise is focused on understanding and working with the elements of enactment (Maroda, 1998). These elements include the centrality of the interpersonal and intersubjective relationship between the patient and the analyst and their coconstruction of meaning, the importance of context and of the here and now in determining the content and form of the patient's and the analyst's self experience and of the transference-countertransference dialogue, the pivotal role of affect and state in the therapeutic process, the pervasive influence of the analyst's countertransference, and the interaction of dynamic memories, dissociation, and here and now experience in evoking the multiplicity of self-states that define and fracture the therapeutic dyad

(Aron, 1996; Bromberg, 1996; Davies, 1996; Hirsch, 1996; Stem, 1997).

Though postmodernists recognize the centrality of these interactive processes for understanding the development and expression of a patient's mental states, when it comes to changing these mental states they focus on transforming the mental contents that determine these states in the patient through reflective understanding (Levenson, 1996). Postmodern psychoanalysts continue to see interpretation as the mutative force in treatment. The goal is to make conscious the unconscious mental contents and associated self-states that contribute to an enactment through their transformation into verbal symbols for self-reflective manipulation (Stem, 1997). Postmodern analysts continue to rely on changing psychic contents through reflective understanding because postmodern theories do not include a model of the mind or a paradigm of development and change that describes how to effect alterations in psychic content and self-states other than by the conscious reconfiguration of verbal symbols. Consequently there is a split in postmodern psychoanalytic theories between an orientation on process in how the patient and analyst come to know and understand one another and a focus on psychic content and its self-reflective manipulation in what the analyst does in helping a patient change.

A new school of psychoanalysts (Beebe & Lachmann, 1998; Clyman, 1991; Fonagy, 1999; Lichtenberg, Lachmann, & Fosshage, 1992; Lyons-Ruth,

1998; Miller, 1996, 1999) posits a resolution to this problem by proposing that psychic contents and their associated self-states can be changed through altering the nonconscious mental procedures that organized and maintain these contents and states. Their approach is grounded in dynamic-systems-inspired research and theory that suggests that the mind is organized and self-states regulated by nonconscious procedures that self-organize in interaction with other minds, other human beings.

This chapter reviews the neurobiological, cognitive-developmental, and attachment research and theory underlying this approach and then presents the implications of this perspective for psychoanalytic practice. The principal thesis of the chapter is that it is the activity of the analyst on the patient that induces a patient to reconfigure the implicit mental procedures that organize his or her mind and regulate self-states.

DYNAMIC SYSTEMS THEORY

Dynamic systems theory explains how physical, biological, and social systems self-organize and how these systems change from one state of organization to another (see Butz, 1997, for a review). The theory posits that living entities self-organize through the co-operative action of elements in an environment that are attracted to one another. As the elements join together their ways of joining determine the structure and function of the entity they

form. The act of coupling transforms the elements into an ordered and stable system of co-operating elements which returns to the environment energy and information that is the product of this transformation. A living system comes into being and continues to exist through the exchange of energy and information with the environment from which it emerged.

Within its environmental context a system prefers a particular organizational state or a set of organizational states that it cycles through. These preferred states represent the dynamic attractors of the system. Attractor states are the states to which cooperative, sustaining elements are drawn. The path taken by the system from one preferred state to another defines its developmental trajectory through time—a trajectory that is extremely sensitive to the initial conditions of the system's formation for its direction. Systems compete for sustaining resources in their econiche. In this competitive environment co-operation between systems increases the likelihood of survival and, consequently, fosters the development of increasingly novel, complex, and adaptive structures.

Living systems transform themselves into more complex and adaptive forms in both continuous and discontinuous ways. Continuous evolution involves the transformation of a system into a more complex form while maintaining its overall stability. Complex systems maintain stability during periods of growth because earlier organizational structures are used as the

templates for subsequent development and because these systems self-organize hierarchically. Each succeeding level of complexity builds upon that which proceeded it. Development is also constrained by the environment. Living systems structure themselves in relationship to the environmental forces impinging upon them. They internally model these exogenous forces by creating homeostatic, regulatory mechanisms that enable the system to maintain stability as these impinging forces change.

Complex adaptive systems can transform themselves into qualitatively new organizational forms through a process of discontinuous change. External (environmental) or internal (systemic) pressure on a system can cause the system to pass from a state of ordered stability to a state of chaotic instability. In the chaotic state the components of the system are relatively free to interact with one another to form new combinations. The move from order to disorder irreversibly alters the trajectory of the system, enabling the system to organize itself in a qualitatively new way. This nonlinear dynamic is the source of rapid, discontinuous change in system states.

NEUROBIOLOGY OF THE HUMAN DYNAMIC SYSTEM

Human beings are complex adaptive systems that self-organize and develop according to the principles just described. The human brain self-organizes through interacting with the social and physical world. Perception,

action, cognition, and emotion are rooted in the dynamic process of pattern formation. Patterns of neuronal firing reflect the experience of acting in and perceiving the world. The patterns that form the concepts which structure the mind grow out of the bodily experience of interacting with the physical and social surround and serve to make sense of it. The body, brain, and mind together form a single dynamic system. The characteristics of this complex adaptive system reflect the social and physical environments out of which it has emerged and to which it has to adapt.

Following Edelman's theory of Neuronal Group Selection (1987), categories of experience (i.e., concepts) self-organize through multimodal correlations of neuronal patterns in real time. For example, in forming a concept of *mother* an infant visually scans the mother's face, smells her milk, feels her skin with its lips and body, and experiences its own body in a particular position in relationship to mother's. Each of these independent sensations of the same object, mother, is neuronally patterned in its own sensory area of the brain, called a first-order mapping. These individual mappings are then remapped on top of one another to create a second-order neural map of the object. The concept of mother, the second-order map, emerges from the real-time correlation of these independent samplings of the same object. The correlation of two or more qualitatively different glosses on the same perceptual information in real time creates our concept of an object.

Concepts are not stored in particular locations in the brain. Rather, categories of experience are bursts of synchronized, mutually reinforcing neuronal patterning that emerge in the context of ongoing activity. In that these second-order maps are activity dependent, what we perceive depends in a precise time-locked fashion on what we do.

Second-order maps perceptually categorize objects in the environment in what Damasio (1999) and Schore (1994) call convergence centers, located in the frontal, orbitofrontal, temporal, and parietal areas of the cerebral cortex. These convergence center maps are synaptically linked to the sub-cortical hedonic centers of the limbic system (the brainstem, reticular formation, hypothalamus, and amygdala) which measure and represent changes in the internal states of the body. Damasio conceptualizes the representation of the body's internal states as the protoself. The integration of the protoself with the second-order maps of objects links the actions of objects on the self to changes in the states of the self. The synaptic interaction of these subcortical hedonic centers, which control homeostatic, appetitive, and consummatory needs as well as emotional reactivity, with the cortical representation of external stimuli creates affectively toned, state-dependent neural maps. Edelman (1987, 1992) proposes that these state-dependent categories of experience, which he calls value-category memory, influence the perceptual categorization of external stimuli by valuing or selecting certain stimuli over others in order to satisfy and regulate the needs of the individual.

The experience of objects causing changes in the body is, for Damasio (1999), the birth of core consciousness: feeling the feelings of being affected by the environment. Similarly, Edelman (1992) conceptualizes core consciousness as the recategorization of lived experience in terms of value-category memory, which he calls the remembered present. The awareness of the self-feeling is the essence of core consciousness. It is a context-dependent experience of the self interacting with the environment.

Damasio (1999) and Edelman (1992) suggest that core consciousness is itself the object of recategorization. This recategorization creates higher order, extended consciousness and self-reflective awareness that is often mediated by mental images, words, and symbols. It comes about in the following way: repeated interactions with the social and physical environments selectively forms patterns of neural activity into stable attractor states. These implicit, nonconscious firing dispositions reflect past interactions with specific objects and contexts. The dispositions or attractor states form longterm autobiographical memory. When these autobiographical memories are activated by an individual interacting with objects or contexts that are similar to those which formed the attractor state, their activation influences the perceptual categorization of the here and now. The recategorization of core consciousness in terms of autobiographical memory adds a sense of personal history to the experience of the here and now as well as provides a model upon which to create expectations about the outcomes of

actions and about future events. It also creates a sense of self with a past and a future, liberating the experience of self from the here and now constraints of core consciousness. And, with the abilities to symbolically represent declarative (autobiographical, semantic, and episodic) memory, to manipulate these symbols, and to reason about mental contents consciousness is expanded to include imagination, creativity, and a higher order sense of self that is often thought of as conscience.

The correlation of longterm declarative memory circuits with second-order maps, linking perceptual categorization of objects with value-category maps of the body, creates global, superordinate neural patterns. These superordinate maps not only influence the organization of their subordinate maps, but the subordinate mappings simultaneously influence the composition of these global mappings, creating reverberating, mutually influencing neural circuits. Thus, the mind and body form an emotional or state-dependent system. Perception, thought, action, and bodily experience form an integrated, mutually reinforcing dynamic system that is itself a reflection of the system's interaction with specific environmental contexts.

Since perceptual categorization and global mappings are altered by ongoing activity, memory in a dynamic systems model results from a process of continual recategorization (Edelman, 1987). Memory is not only inexact but messy as well. By its very nature memory is procedural and involves

continual motor activity and repeated rehearsal in different contexts. Because of the new associations arising in these varied contexts, because of changing inputs and stimuli, and because different combinations of neural groups can give rise to similar output, a given categorical response in memory can be achieved in several ways (Edelman, 1992). Thus, memory is not rigid or fixed, but highly dependent on the whole context of the current situation and the history of the remembered category. Each memory is dynamically constructed from many, but not all, of the previously facilitated connections, and, as a dynamic attractor, a memory may also pull in associations not previously included in that category. Because categories of experience are probabilistic and context-bound, the memories that are based on these categories are fluid and inexact (Thelen & Smith, 1994).

Behavior too is messy, fluid, and highly context-dependent when looked at from the level of what a person does in a specific context. Yet, from the perspective of the individual organism behavior may appear predictably regular and ordered. From adynamic systems perspective global order (i.e., a general category of experience) and local variability (its contextual expression) are tied together in a way that gives context a special status. Thelen and Smith (1994) posit that context—the immediate here and now—effects what we know and how we act in three ways: (1) Context makes global order in that global order is the history of perceiving and acting in specific contexts. It is through repeated here and now experiences that global order is

elaborated. (2) Context determines global order in that context selects the concept or behavior to be used. (3) Context adapts global order to fit the task at hand. Context makes, selects, and adapts what we know because knowledge is only manifest in a real-time task. Since global order is made by and made manifest in the details of the here and now, it is fundamentally always context-dependent.

ATTACHMENT RELATIONSHIPS AND SELF-ORGANIZATION

Every person is a self-organizing system that creates his or her own states of brain organization. These organizations are initially formed and subsequently developed into more coherent, complex, and adaptive states through coupling with another self-organizing system, another individual. The environment within which human beings self-organize is their attachment relationships to other human beings. A major function of the attachment relationship is to promote a synchrony of biological, behavioral, and self systems within and between the individuals that constitute this environment.

Schore (1994) and others (Emde, 1990; Stem, 1985; Tronick, 1989) posit that the coupling of human systems is first and foremost an emotional joining between two independent selves. A mother and infant, for example, form a system of contingent responsivity in which they exchange biologically

significant information about each other's state-of-being through the emotions they express. This dynamic state sharing creates an organized dialogue between mother and infant in which both partners match states and then simultaneously adjust their social attention, stimulation, and arousal in response to signals from the other. In exchanging this information about their subjective states, mother and infant together constitute a dynamic system in which their individual homeostatic systems are open, linked, and accessible to regulation from the other.

The critical emergent property of the mutual regulation of emotion between mother and infant is the creation of a singular dyadic state of organization. Tronick (1998) thinks of this shared state as a dyadic expansion of consciousness in which the participants' individual states of consciousness (i.e., brain organization) become dyadic and expanded to incorporate elements of consciousness of the other in a new and more coherent form. The mother-infant system contains more information, is more complex and coherent, than either the infant's or mother's state of consciousness alone. When this dyadic state of consciousness is achieved there is a restructuring and change in the present and past mental organization of both the infant and the mother.

The creation of this dyadic state of consciousness requires a reciprocal mapping of some of the elements of each partner's state-of-being onto the

other partner's brain. Though reciprocal, this mapping process will be illustrated from the perspective of the infant in a mother-infant pair. Schore (1994) posits that mutual mapping occurs when the infant's bodily states are changed by the mother's regulation of the child's autonomic nervous system. During attachment experiences the mother resonates with and then modulates changes in the infant's arousal levels and, consequently, in its energetic state. This experience-dependent process influences the creation and stabilization of the neurological circuitry that links the infant's cortical maps representing external objects with the sub-cortical maps representing bodily experience.

The mother's selective attunement to the infant's self-states functions as an agent of natural selection in shaping these circuits, thereby influencing the emergence of the infant's sense of self. This selective shaping of the neural circuitry enables the infant's brain to self organize into increasingly complex forms which are functionally attuned to the contexts in which they were reinforced.

For example, in studying the dyadic structuralization of the brain, Dawson and her colleagues (Dawson et al., 1999a, 1999b) found that in comparison to nondepressed mothers depressed mothers more often matched negative states with their infants than they shared positive states. Their interactions with their infants were insensitive and noncontingent (e.g.,

unsolicited tickling, poking, and touching). Depressed mothers responded to their infant's bid for attention by withdrawing, holding or moving the infant away, or by rejecting contact. They were also less likely to repair interrupted interactions and to right dysregulated states.

The infants of depressed mothers were less affectionate and less likely to touch their mothers than the infants of nondepressed mothers. They were more aggressive toward mother and more demanding of her attention. They tended to be withdrawn, less active, and to exhibit diminished positive affect. They experienced negative emotions and poorly regulated states of arousal more frequently than did the infants of nondepressed mothers.

Dawson's EEG recordings of the study subjects showed that depressed mothers amplified the neuronal circuits in their infants involved in the experience of negative affect while failing to amplify the neuronal circuits involved in the creation of positive affect. The noncontingent, insensitive, and nonreparatory behavior of depressed mothers failed to develop the neurological circuitry their infants required to regulate emotional experience and control behavior. Children and adults whose EEG patterns match those of Dawson's infants of depressed mothers have difficulties with affect regulation, impaired social perception and judgment, and low self-esteem (Schore, 1997).

The stabilization of these experientially selected neuronal circuits may be thought of as the attractor states of the self-system, memories inherent in the reverberating circuitry itself, that can maintain the system's organization by acting as adaptive homeostatic regulatory mechanisms that allow for stability in the face of external variation. Of particular importance in the regulation of emotional states and in adapting to changes in the social surround, posits Schore (1994, 1997), are two cortical-subcortical circuits: the excitatory (sympathetic) limbic circuit, which is involved in the generation of positively valenced motivational states, and the inhibitory (parasympathetic) limbic circuit, which stimulates negatively toned states. These two circuits join with circuits from virtually all other areas of the brain in a convergence zone in the orbital prefrontal cortex of the right hemisphere. In this center, the perception of an environmental stimulus is emotionally tagged with a positive or a negative valence and an adaptive response, either energy expanding or energy conserving, is initiated. In this way are changes in the external environment appraised, internally modeled, and adapted to in personally meaningful ways.

Social appraisals and adaptations are accomplished at levels beneath conscious awareness by multimodal sensory scanning of the environment, and the attractor states formed act as nonconscious biases that guide behavior. The set of attractor states created regulate affect and motivation, maintain self-organization through emotional equilibrium, and store internal

working models of interactions with others that contain information about state transitions and resolving emotional disequilibrium. These attractor states and the neural circuits from which these states emerge are a person's procedural memory for maintaining self-cohesion in interaction with the environment.

Since the attractor states formed are dynamically assembled, the system is capable of rapidly changing between states as new external or internal conditions destabilize the current organization thereby allowing a new interpretation to form. The chaotic variability of this open self-regulatory system enables it to adapt flexibly to an ever-changing environment. In that these regulatory procedures and their emergent attractor states are constituted by the right hemisphere, emotional homeostasis and social adaptation are achieved principally through bidirectional right brain to right brain nonverbal communication of emotional information between the individuals who are forming an adaptive system (see Schore, 1994, for a review).

EMPIRICAL VALIDATION

This dynamic systems model has been validated by attachment studies (Main, 2000; Schore, 1997). Different types of attachment dynamics have been shown to produce different types of internal working models.

Caregivers who contingently and flexibly respond to their children create synchronized states of autonomic homeostasis in which sympathetic and parasympathetic components operate reciprocally enabling the children to organize and to regulate self-states, especially under stress (Schore, 1997). These securely attached children have a system of regulatory procedures that can adaptively change in response to environmental perturbations, yet retain continuity. Their internal working models are open to forming a dyadic homeostatic relationship with another human being. Their interactions with others are collaborative and reciprocal.

Children who experience frequent attachment disruptions, are chronically exposed to stressful states, or have interactions with an emotionally unresponsive or misattuned caregiver generate nonsynchronized states of autonomic homeostasis in which sympathetic and parasympathetic components can not operate reciprocally, making it difficult for these children to organize and regulate self-states (Schore, 1997).

Mothers of children who have insecure resistant/ambivalent attachments have been shown to be insensitive to their children's signals and unpredictable in their responses to them (Main, 2000). They have difficulties regulating their own emotions, are intrusive, and exhibit self/other confusion. These ways of relating encourage hyperarousal in their children, expanding the sympathetic system while diminishing the inhibitory parasympathetic

system. Biased toward states of high arousal these children have difficulty inhibiting their emotions and controlling their negative thoughts (Schore, 1997). They underregulate themselves and tend to hyperactivate their attachments systems when stressed so as to have others aid in reducing anxiety and distress and in reinforcing positively valenced emotions. They are so focused on their attachments, exhibiting clinging and controlling behaviors, that they cannot disengage from the others when these others are the source of the child's distress (Main, 2000).

Children with insecure-avoidant attachment styles have their inhibitory, parasympathetic circuits reinforced in interactions with mothers who are rejecting of their child's attachment, adverse to tactile contact, emotionally withdrawn, and interactively noncollaborative (Main, 2000; Schore, 1997). These children are biased toward reduced emotionality and states of low arousal. They tend to overregulate themselves, have low accessibility to negative memories, avoid emotional contact with others, and are overly self-reliant. Under stress insecure avoidant children regulate their emotional states by deactivating their attachment system, closing themselves off to the influence of others.

Internal working models embody the procedural memories that mediate affect regulation, self-esteem maintenance, social adaptation in times of stress, and relations with others. The implicit regulatory procedures that

comprise these models are transmitted from caregiver to child, with the child developing a unique model for each specific caregiver (Main, 2000). The models have been shown to form general dispositions, superordinate attractor states, that mediate attachments with others over the life span.

Longitudinal studies by Waters et al. (2000) and Main (2000) show that under ordinary life circumstances working models remain stable over decades, but they are open to change when significant life events change caregiver behavior toward the individual. Pietromonaco and Feldman Barrett (2000) conceptualize a person's attachment style as an “attachment trajectory” that occurs over one's life span. Interactions with the primary caregiver early in life lay the basic set of regulatory procedures which is then elaborated in complexity and diversity by relationships with subsequent attachment figures. Studies by Hazan and Shaver (1987), Main (20(H)), Mikulincer (1995), and Pietromonaco and Feldman (1997) found that securely and insecurely attached adults exhibit the same implicit regulatory procedures as do their childhood counterparts. When they are distressed, secure, avoidant, and anxious/ambivalent adults deploy their attachment systems in the regulation of self-states in the same way as the children with a matching attachment classification. Mikulincer (1998) and his colleagues (Mikulincer. Orbach, & Iavnieli, 1998) have also shown that in adults the implicit regulatory procedures that make up their internal working models are subject to modification by alterations in the behavior of attachment

figures toward the individual or by changes in the context in which the attachment behavior occurs.

IMPLICATIONS FOR PSYCHOANALYTIC PRACTICE

In order to change how a patient organizes and regulates self-states, relates to others, and interprets lived experience, the implicit procedures by which these states and concepts are neurologically encoded must be altered. The process by which these neurologically based procedures and their emergent organizations of self are transformed is the same process by which these dynamic organizations were constituted and sustained: through the regulation of self-experience within the adaptive context of an individual's attachments to significant others. It is, therefore, through the analyst's engagement of a patient's attachment system that the internal working models that organize and regulate self-experience and coordinate it with another are made manifest and open to modification.

The analyst facilitates the unfolding of a patient's attachment system by the ways in which the analyst responds to the patient in the process of coordinating their individual self-states into a single dyadic system. Furthermore, it is in the process of forming and transforming their dyadic system that the analyst influences the implicit procedures that structure the patient's internal working models. The patient and the analyst mutate their

jointly constructed system, and their individual working models, into increasingly adaptive forms in the course of simultaneously adapting to one another through the contexts of meaning that define their connection.

TRANSFERENCE-COUNTERTRANSFERENCE ENACTMENTS AS VENUE OF TREATMENT

As the patient and the analyst synchronize their states over the vicissitudes of their interactions, their jointly constructed dynamic system grows in complexity and depth, accumulating a set of ways in which the patient and the analyst typically interact. These patterns of interaction recursively and thematically structure their relationship, forming a latticework of attractor states for understanding and relating to one another. If we define transference as the states of the patient that emerge from these typical ways of interacting with the analyst and countertransference as the states of the analyst that emerge from these recursive patterns, the venue of working on the implicit organizing procedures that issue these states is in the transference-countertransference dialogue.

The interpersonal, role-responsive (Sandler, 1976) nature of coordinating states makes psychoanalytic treatment a series of transference-countertransference enactments. Enactments are the actualization (Sandler, 1976) within the patient-analyst dynamic system of the affective states, beliefs, and expectations generated by the assimilation of the analytic

interaction to the activated internal models of the patient and the analyst. Based on implicit social appraisals of their own and the other's reactions and behavior, the patient and the analyst work to make the other conform to their internal models (psychic representations) of how reality should be. In this way intrapsychic experience is rendered interpersonally, making the procedures that organize subjective experience, and the meaningful embodiment of that experience in personal beliefs and expectations (Dorpat & Miller, 1992), the basis of the negotiations between the patient and the analyst in the coconstruction of their dynamic system; a system that weaves individual subjectivities into an evolving, complex intersubjective matrix . Enactments are thus the intersubjective container or context of meaning within which the implicit organizing schemes of the patient and of the analyst are coordinated in terms of their here and now interaction. It is on this interpersonal organization and the meanings that emerge from this interaction that psychoanalytic interventions operate.

THE REAL-TIME, CONTEXT-DEPENDENT NATURE OF THE ANALYTIC INTERACTION

Analytic treatment focuses on the states that emerge within transference–countertransference enactments. From the patient's perspective, these states are the product of the recategorization of the patient's past experience with significant others, including the analyst, in

terms of the feelings and values activated in interaction with the analyst. The here and now context selects the internal working models and associated general dispositions of the patient to fit as best as is possible the specific features of the current moment with the analyst. The patient then adapts or repattems the implicit regulatory procedures underlying these models and dispositions to fit the here and now context, creating states that are a unique reflection of the patient's interaction with the analyst. These states are a real-time response to the activity of the analyst in relation to the patient. It is the analyst's activity—be it the analyst's ways of modulating the patient's emotions, attending to disruptions in their connection, or interpreting the meaning of the patient's behavior—that call out and then influence the implicit procedures that organize the patient's adaptation to the analytic interaction.

Reciprocally, the states of the analyst are his or her adaptive response to the patient's behavior. The analyst's capacity to understand the patient's experience and to respond appropriately reflects the degree to which the analyst's internal working models have remained open to the patient's influence. To be effectively resonant with the formation and transformation of the patient-analyst system, the analyst's behavior must reflect his or her genuine and authentic experience of the patient. The dispositions and actions of the analyst must be allowed to reorganize freely to fit the here and now moment with the patient.

The analyst's responses and activity cannot be scripted or programmed. They must be allowed to emerge naturally in response to the quality of analytic interaction. Stem (1998) has aptly likened the analyst's therapeutic behavior to musical improvisation: the analyst responds authentically and immediately to the feelings and meanings evoked by the here-and-now encounter with the patient, while allowing his or her implicit self knowledge, training, understanding of the patient, and adherence to the transference-countertransference themes to inform his or her spontaneous behavior.

PSYCHOANALYTIC INTERVENTIONS

The therapeutic action of psychoanalytic interventions occurs in the process of forming, maintaining, and transforming the patient-analyst dynamic system. Interventions are activities by the analyst that impact the implicit regulatory procedures that a patient uses in adapting to the behavior of the analyst.

In coordinating their individual working models into a dyadic dynamic system, the patient and the analyst work to understand and adaptively respond to one another. This process of mutual adaptation requires that the patient and the analyst continuously exchange information about their moment to moment states-of-being. To this end the patient and the analyst consciously voice and nonconsciously express their emotional reactions to

the ideas and feelings exchanged between them. They then consciously and nonconsciously attempt to coordinate their own state with what they have perceived in the other by altering their own experience to match that of the other or by influencing the other to match, validate, or complement their internal state through the emotions expressed in their behavior, voicing, and statements.

The achievement of a coordinated state constitutes the formation of a working dynamic system. It is a jointly constructed intersubjective state of shared consciousness within which the mind of the patient and the mind of the analyst are expanded into more complex, coherent, and adaptive forms by the inclusion of aspects of the other's experience. The reciprocal mapping of elements of each participant's experience onto the brain of the other provides the pair with the means to reformat their existing neuronal maps, and, thereby, to recategorize the experiences these maps embody to reflect the experience of the therapeutic relationship.

The analytic relationship is in a constant state of movement as patient and analyst negotiate the issues and events that define their connection. Coordinated states give way to miscoordinated states, attunement to misattunement, and union to disunion. So in addition to the ways in which the patient and analyst form and maintain their dynamic system, the ways in which both the patient and the analyst work to repair disruptions in their

connection, understand empathic failures, and right dysregulated states are incorporated into procedures that constitute and transform their dynamic system. These reparative procedures also reformat the neurological patterns employed by the patient and the analyst in reconstituting their individual and shared dynamic systems.

CORRECTIVE EMOTIONAL EXPERIENCES AND THE PSYCHOBIOLOGY OF INTERVENTIONS

Given that the coordination of states between the analyst and patient is primarily accomplished through the exchange of affective information, the ways in which the analyst metabolizes and feeds back to the patient the affective energy between them provides the embodiment or experiential context in which all psychoanalytic interventions operate. How the analyst manages his or her own emotions and those of the patient influences how the patient feels in the transference-countertransference dialogue at any particular moment. For example, in the process of coordinating their emotional experience the analyst's empathic resonance with and modulation of a patient's affective state may help the patient better co-ordinate his or her sympathetic and parasympathetic reactions to their exchange, thereby enabling the patient to better control certain emotions. Alternatively, the analyst may facilitate a patient's formulation and experience of emotions that have not been within the patient's range or repertoire by expressing and

holding a particular emotional response to their interaction long enough for the patient to physiologically resonate with the feeling, thereby creating the neural circuitry to recreate that feeling in similar circumstances. Likewise, the analyst can help a patient form procedures for ameliorating negative or disruptive emotional states by resonating with these states and then ratcheting downward to within tolerable levels the shared emotional state. As the co-constructor of the patient's affective experience, the analyst's emotional reactivity and emotional holding can act as a scaffolding for sustaining emergent organizations of feelings within the patient.

The reformatting of the cortical-subcortical connections that result from these affectively based interventions within the context of meaning provided by the transference-countertransference dialogue enables the patient to reinterpret and to assign new meanings (i.e., recategorize) to the models of attachment activated by the here-and-now interaction. For example, the analyst's emotional resonance with and amplification of the patient's positively valenced states generates amplified levels of vitality affects that bathe in positive feelings the patient's internal representations of him or herself and of the analyst, as well as the procedures of mutual interaction and regulation that bind them. The formulation of this new and secure attachment bond with the analyst revises the activated attachment scheme, and the associated memories and beliefs about the self and others, in light of the analyst's reactions to the patient. The analyst's emotional reactions and

selective attunement to a patient's states influences how the patient organizes and interprets both here and now as well as past events.

These affectively directed interventions are effective because they operate in vivo on experiences that are in the process of being formed. They aim to effect alterations in the ongoing procedures that instantiate emotional states and interpretively categorize the patient's interactions with the analyst. As such, these interventions are corrective emotional experiences.

A primary way that the analyst accesses a patient's subjective experience and attachment strategies is through grappling with his or her own feelings and reactions to the patient. The analyst's body is the primary instrument for psychobiological attunement (Damasio, 1999). The implicit, right brain to right brain regulatory communications between the patient and the analyst create bodily states that reflect the affective experience of the analyst in relationship to the affective experience of the patient (and vice versa). So it is first through the analyst's somatic sensations and affective states that he or she begins to apprehend his or her own as well as the patient's adaptation to their interaction, and it is initially with these feelings that a response to the patient begins to take form. The analyst's visceral response is then colored by the associations, memories, and internal working models activated by these states. If the analyst becomes self-reflectively aware of these gut feelings and associations, he or she can formulate a

consciously considered response or linguistic encoded interpretation to the patient (Damasio, 1999; Edelman. 1992).

The analyst's attention to his or her subjective, bodily based states and their associated ideational material is particularly important in the interactive regulation and repair of a patient's primitive, intensely negative, and disorganized states (Ogden, 1994). Schore (2002) observes that when the analyst resonates with a patient's negatively valenced state, the analyst experiences increased negative arousal in him or herself. The internally amplified negative state throws the analyst's right brain into a state of disequilibrium as the analyst tries to manage both his or her own negative feelings and those of the patient. If the analyst cannot successfully autoregulate his or her own negative states, the analyst's will feed back to the patient unmodulated negative affect in his or her tone of voice, facial expression, or verbal interpretation. As a result of this stressful communication from the analyst, a pathological attachment scheme is activated in the patient representing a misregulated self interacting with a misattuning other. The patient instantly accesses an insecure attachment model which activates autoregulatory procedures for dealing with interactively generated stress. The patient-analyst dynamic system becomes increasingly unstable as both the patient and the analyst each amplify the negative affective state.

Though the repair of this mutually generated dysregulated system requires participation by both the patient and the analyst, it most often falls upon the analyst to initiate the repair. Schore (2002) notes that in order for the analyst to maintain a reparative holding environment while under intense interactive stress, the analyst must resist the homeostatic impulse to regulate his or her state of right-brain disequilibrium by shifting into a left-hemispheric-brain state. If the analyst fails to initiate a right-brain autoregulatory procedure and shifts into a linear, left-brain mode, he or she is likely to make premature verbal interpretations that amplify the misattunement between him or herself and the patient.

In order to create a therapeutic holding environment, Schore (2002) posits that the analyst must instantiate a right-brain regulatory strategy in which the analyst can detect, recognize, monitor, and regulate the bodily states that are evoked in reaction to the patient. While continuing to be open to the patient's communications, the analyst attunes to his or her sensory and affective reactions to these communications, holding onto these sensations long enough to allow the feeling states and their associated autobiographical memories and images to enter consciousness. In this state-dependent recall, the analyst's implicit procedural memories and regulatory strategies can be summoned to regulate the here-and-now negative state that binds the patient and analyst. It is in this transitional state (Winnicott, 1953) of reverie (Ogden, 1994) that the implicit procedural schemes employed to regulate the

analyst's own affect can be interactively made available to the patient's right brain for use in regulating the patient's own bodily states (Schore, 1994).

It is how the analyst interacts with a patient that shapes the patient's internal working models and the implicit procedures with which self-experience is organized and regulated and relations with others are made and maintained. The analyst's ways of repairing ruptures in their emotional connection, righting dysregulated states, becoming intimate, dealing with anxiety and fear, expressing and responding to anger and disappointment, playing, and joking, all influence the patient's procedures for maintaining self-states and for being in the world with others as the patient modifies these procedures to fit the analyst's behavior.

The analyst's behavior is not just responsive in relationship to the patient. The analyst also initiates interactions with the patient that require mutual adjustment of their regulatory schemata. Like the patient, the analyst has attachment needs and states of being that require specific regulatory responses. Even in the most self-aware analyst, many of these regulatory needs are not consciously known because they stem from the analyst's unconscious social appraisal of the here and now analytic interchange. The analyst's behaviors may be experienced as implicit commands to the patient to meet his or her regulatory and attachment needs. Indeed, as Bacal (1995) notes, if these needs are not met by the patient, the analyst's adaptation to

their interaction and his or her analytic abilities may be compromised. Though the patient will adapt his or her implicit regulatory schemes in addressing the analyst's needs, the analyst will in turn remodel his or her implicit procedures and attachment models to conform to the procedures and models the patient employs in responding to the analyst. Change always involves mutual and reciprocal, though not symmetrical, adaptation—no matter who initiates the process.

RECATEGORIZATION—EXPERIENCE-BASED INTERVENTIONS AND INTERPRETATIONS

Psychoanalytic treatment, from the perspective proposed here, does not function to recover or correct repressed memories, wishes, or fantasies. Rather, psychoanalysis enables the patient to recategorize memories, desires, and beliefs in terms of the feelings, values, and ideas experienced with the analyst. The implicit procedures activated to organize and interpret an interaction with the analyst bring with them autobiographical memories, concepts, and beliefs that have been associated with these procedural schemata in the process of their formation and subsequent elaboration. As the patient modifies these procedures in response to the analyst's behavior, the memories and beliefs associated with these states may be experienced in a new affective light, re-evaluated and reinterpreted, or brought into a new alignment with related memories, concepts, and beliefs. This is an active but

not necessarily a conscious or self-reflective process. The recategorization of memories is a nonconscious process that attains symbolic status only when the patient's self-reflective awareness is activated (Edelman, 1992).

The analyst's activity can also effect alterations in the patient's selfrepresentation, self-reflective capacities, and abilities to use psychological, motivational, and subjective experience in understanding his or her own and others' behavior. In forming a dyadic system, both the patient and the analyst construct mental models of the other in reference to themselves and then communicate these mental representations to the other. The externalized representation is processed by each of them as an object impinging on the self, and their self-representation is adapted to that object in the process of recategorizing the emotional experience of their here and now encounter. Thus, for example, if the analyst understands the psychological motivations of a patient and addresses these motivations in the course of interpreting an aspect of their interaction, or expresses this understanding in his or her affective responses or in how he or she behaves toward the patient, the patient is compelled to reconcile the analyst's representation of the patient with his or her current self-state. The patient works to accommodate his or her self representation to the image of the patient proffered by the analyst by altering the implicit regulatory schemata that determine the patient's self-concept in relationship to his or her subjective experience and to the analyst's experience and representation of the patient.

Though the process of reconciling the analyst's representation of the patient with existing self-states, beliefs, and autobiographical memories is usually a nonconscious procedure, as a conscious process it can enhance a patient's ability to reflect on his or her own mental states and those of the analyst (Benjamin, 1988; Fonagy, 2000). The analyst's capacity to think about and hold in mind a patient's affective and psychological states allows the patient to experience and explore the analyst's mental representation of those states. The scaffolding provided by the analyst's construction of the patient as an intentional, motivated individual enables the patient to think about himself or herself as a psychological being who is motivated by intentions, wishes, and feelings. Thinking about the self in these psychological ways creates the implicit procedures required to use mental states and intentions in reasoning about the self and others.

From the perspective articulated above, in which the patient reformulates the implicit procedures that organize the self and other schemata and recategorizes their content in light of the analyst's representations of the patient, verbally encoded interpretations are functionally identical to interventions. They both initiate a process within the patient of reconciling his or her internal representations of self and other with those proffered by the analyst. Ogden (1994) has recognized the functional similarity between the interventions that occur during enactments and interpretations by labeling the former "interpretative action."

Verbal interpretations are similar to interventions in that they represent and express the analyst's experience of and ideas about the patient's motivations, emotional states, conflicts, and beliefs, as well as provide the patient with insight into the analyst's subjective experience, motivations, conflicts, beliefs, and psychological states (Aron, 1996). The injection into the patient-analyst dynamic system of the analyst's subjective experience and interpretations of his or her own and the patient's internal life, via verbal interpretation or intervention, pressures the system to adapt to this information and motivates the patient to not only reconcile his or her regulatory procedures with those of the analyst, but also to co-ordinate his or her subjectivity with the subjectivity of the analyst. This process of reconciliation and coordination involves both parties as the patient and the analyst negotiate the emotional states engendered by meanings attributed to the analytic interchange (Dorpat & Miller, 1992). Out of this process of negotiation emerges a more complexly differentiated yet integrated intersubjective relationship between the patient and the analyst.

Verbal interpretations differ structurally and neuropsychologically from the general class of interventions discussed above in that they are a left-brain activity in which nonlinear experience is rendered linear via verbal symbolization. The process of verbal symbolization breaks the natural, nonlinear bonds between the elements that constitute an experience, recasting the experience in a linear, cause-and-effect form. Verbal

interpretations are, thereby, distanced from here-and-now emotional experience. As symbolic representations they require a patient to engage left-hemispheric processes to decode the communication and assimilate its meanings to the appropriate schemata. Though much of this processing is done nonconsciously, verbal interpretations focus a patient's consciousness on what the analyst is saying, thereby engaging the patient's self-reflective attention. Thus verbal interpretations tend to move patients (and the analyst) from whatever here-and-now state of being they are *experiencing* to a self-reflective state that is *about* an experience, real or imagined.

In this reflective, analytic frame of mind the patient can logically reason about his or her experience and its current and historical determinants. The patient can also explore the analyst's inferences about the patient's inner life, motivations, and behavior as well as reflect on his or her thoughts about the analyst's psychology and motivations. This self-reflective consideration of the subjective elements of the patient's interaction with the analyst promotes the development within the patient of a theory of interacting minds (Fonagy, 2000) that is required for the patient to recognize and co-ordinate his or her subjectivity with that of the analyst (Benjamin, 1988). The patient and analyst can then "analyze" together the nature of their interchange, reflect upon the meanings generated, and formulate new ways of interacting.

These left-hemisphere-dominant analytic processes are, however, much

more complex and difficult to work through because self-reflective analysis, mutual exploration, and verbal interpretations employ language to represent and to communicate ideas. Language imbues the experience it refers to with cultural, social, and gendered meanings much more than do more experience-near enactments and interventions. Thus, the task of analysis requires the additional deconstructive process of culling personal experience from the social, cultural, and gendered biases inherent in the representations of that experience (Stem, 1997).

In order for these left-hemispheric, verbally mediated processes to effect change in the self and interpersonal schemata (neural networks) that are organized by the right hemisphere (Damasio, 1999; Schore, 1994, 1997), verbal interpretations and analytic dialogue must be made within the affective context of the here-and-now transference-countertransference enactment of the attachment bond between the patient and the analyst. The adaptive context created by the activated self-and-other schemata permits the higher-level categorizations produced by the left-cerebral activity to influence and transform the second-order mappings that organize and interpret self-experience constituted by the right hemisphere (Edelman, 1992). Thus the timing of verbal interpretations is very important. They must be emotionally resonant with the patient's here-and-now experience to impact the networks that organize and interpret that experience, but, as noted above, they cannot be made so early that they remove the patient and

analyst from the experience that will be the referent of the interpretation. I have found that verbal interpretations and mutual analysis work best when they follow on the heels of an enactment. At this point in the therapeutic process, what Stem (1998) calls a “now moment,” the feelings and meanings that have emerged from an enactment are available for recategorization in ways that have an immediate and tangible effect on the patient's experience of him or herself and of the analyst.

In conceptualizing verbal interpretations as forces that impinge on the self and initiate recategorization of self-experience, verbal interpretations can be understood as a class of interventions that, although structurally distinct from interventions as left-brain as opposed to right-brain activities, function in the same way as other interventions: to transform the structures that organize experience in ways that enhance the adaptive fit between the patient and the analyst.

CONCLUSION

Dynamic Systems Theory casts psychoanalysis as an activity-dependent, experientially based treatment in which the analyst's behavior toward the patient produces changes in the ways in which the patient organizes and interprets self-experience and relates to others. By specifying how the analyst effects alterations in the neurologically based procedures that organize and

transform a patient's mind and self-states, Dynamic Systems Theory resolves the postmodern conundrum of how to alter psychic contents and their attendant self-states through the interpersonal and intersubjective processes that create and sustain the patient-analyst interaction. In addition to bringing interpretation and self-reflective analysis under the same procedural umbrella as interventions and enactments, a dynamic systems approach unites interpersonal, intersubjective, and intrapsychic processes a into single, reciprocally influencing system.

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